Ambient Air Quality Monitoring
Opportunity and Warm Springs Sites
Second Quarter of 2008

Prepared for

Anaconda Deer Lodge County

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Table of Contents

1.0 INTRODUCTION

This quarterly report documents the ambient air quality monitoring program conducted by Kuipers & Associates on behalf of Anaconda Deer Lodge County at Opportunity and Warm Springs locations adjacent to the Atlantic Richfield Lower Waste Management Area. The months of April through June 2008 are included in this quarterly report, with a more detailed data summary in the monthly reports.

Objectives of this quarterly report are listed below.

- Summarize the PM10 data on a quarterly basis and compare to applicable standards.
- Compare daily average PM10 values recorded by both the Opportunity Site and the Atlantic Richfield Company's South Site.
- Present summarized meteorological data for the quarter.
- Present the Data Quality Summary (PM10 and meteorological).
    - Review the hourly data according to the Environmental Protection Agency's Air Quality System Null Data Qualifier Codes.
    - Format hourly PM10 data for each month to fit the Environmental Protection Agency's Air Quality System raw data template.

Figure 1 shows the ADLC monitoring locations in Opportunity and Warm Springs, and the Atlantic Richfield Company’s South Site monitoring location.


ADLC Warm Springs PM10
ARCO North PM10
ADLC Opportunity PM10
ARCO South PM10
feet
0 625 1,250 2,500 3,750 5,000
N
Water & Environmental Technologies
Anaconda Deer Lodge County
Air Quality Monitoring points
Figure 1

2.0 PM10 DATA SUMMARY

The Met One E-BAM PM10 portable monitors collected continuous hourly data at both locations from April 1 through June 30.

During the period of operation, data recovery was 99.3% at Opportunity and 99.5% at Warm Springs. Detailed ambient air quality monitoring results for the second quarter of 2008 are summarized in the April, May and June monthly reports prepared by Kuipers & Associates. A general discussion of ambient air quality monitoring data from the second quarter of 2008 is provided in the following sections. All PM10 data are reported at Local temperature and pressure (LTP) conditions.

2.1 Opportunity Site

At the Opportunity location daily average PM10 concentrations ranged from non-detectable to 39 µg/m^3 with an average of 7 µg/m^3 throughout the second quarter. The maximum daily average PM10 reading of 39 µg/m^3 was observed on April 19, when fairly strong (up to 6.6 m/s or 14.8 mph) northerly winds occurred during the latter part of the day. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 40 µg/m^3 in April, 24 µg/m^3 in May and 23 µg/m^3 in June. Daily PM10 average concentrations for the quarter are presented in Figure 2 for the Opportunity monitoring site.

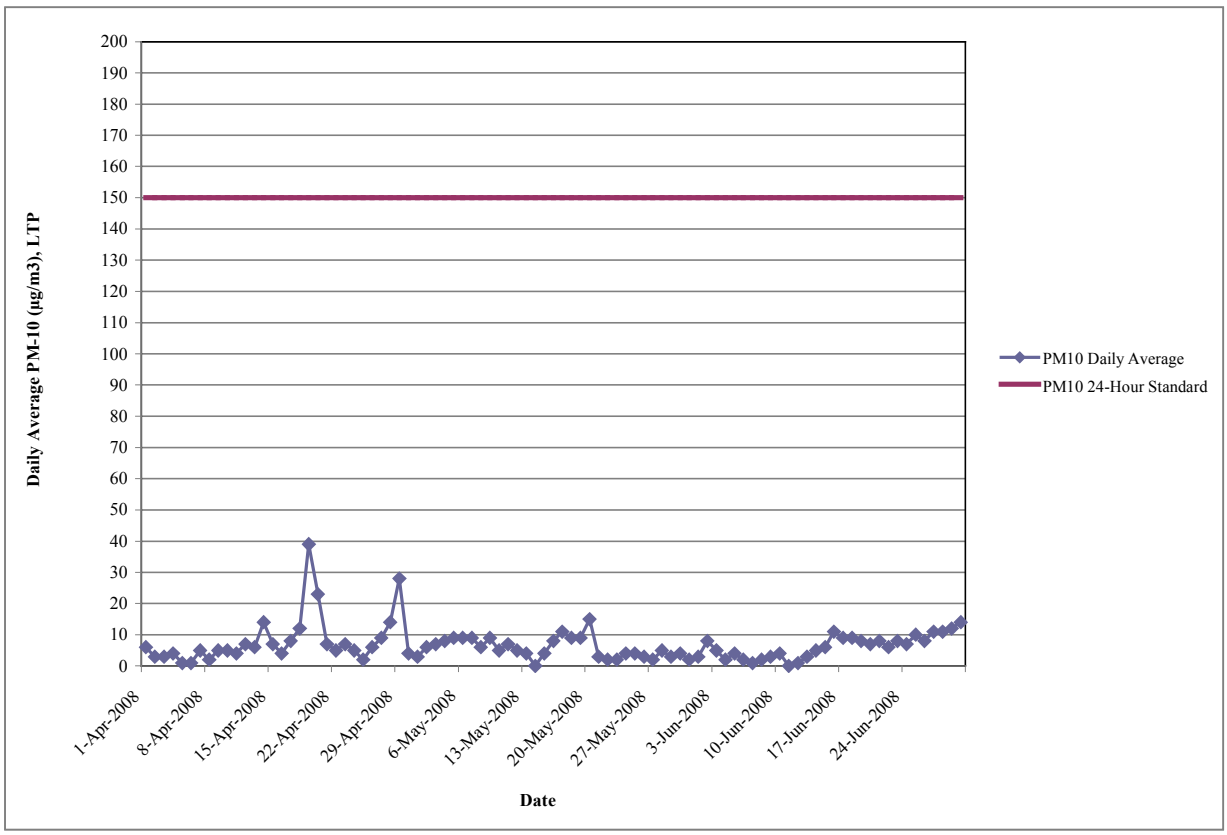

FIGURE 2 – OPPORTUNITY SITE DAILY AVERAGE PM10 CONCENTRATION

All daily average PM10 results for the second quarter of 2008 at Opportunity were below the 24-hour Montana Ambient Air Quality Standard of 150 $\mu g/m^3$.

No Opportunity PM10 data from the second quarter was rejected or omitted for quality assurance or quality control check results. However, minor data losses occurred due to operational problems. In May, seven hours of PM10 data were lost because of sampler flow failure. No cause for that problem was identified, but it has not recurred since.

2.2 Warm Springs Site

At the Warm Springs location daily average PM10 concentrations ranged from non-detectable to 60 $\mu g/m^3$ with a quarterly average of 7 $\mu g/m^3$. The maximum daily average PM10 reading of 60 $\mu g/m^3$ was observed on April 19. The wind data for the highest PM10 period were unavailable due to icing of the wind instruments, but it is suspected that moderate northerly winds were present based on data from the Opportunity site. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 30 $\mu g/m^3$ in April, 22 $\mu g/m^3$ in May and 58 $\mu g/m^3$ in June. Daily PM10 average concentrations for the quarter are presented in Figure 3 for the Warm Springs monitoring site.

An unusually high hourly reading of 1,128 $\mu g/m^3$ occurred at the Warm Springs location on June 22. The daily average PM10 concentration was 56 $\mu g/m^3$on June 22, and no other hourly readings were elevated. The sampling tape was examined, and a very heavy brownish dot was found, indicating the reading was valid. The reading occurred during light ***northerly*** winds, and was probably not related to windblown tailings dust.

All daily average PM10 results for the second quarter of 2008 at Warm Springs were well below the 24-hour Montana Ambient Air Quality Standard of 150 $\mu g/m^3$.

No Warm Springs PM10 data from the second quarter was rejected or omitted for quality assurance or quality control reasons.

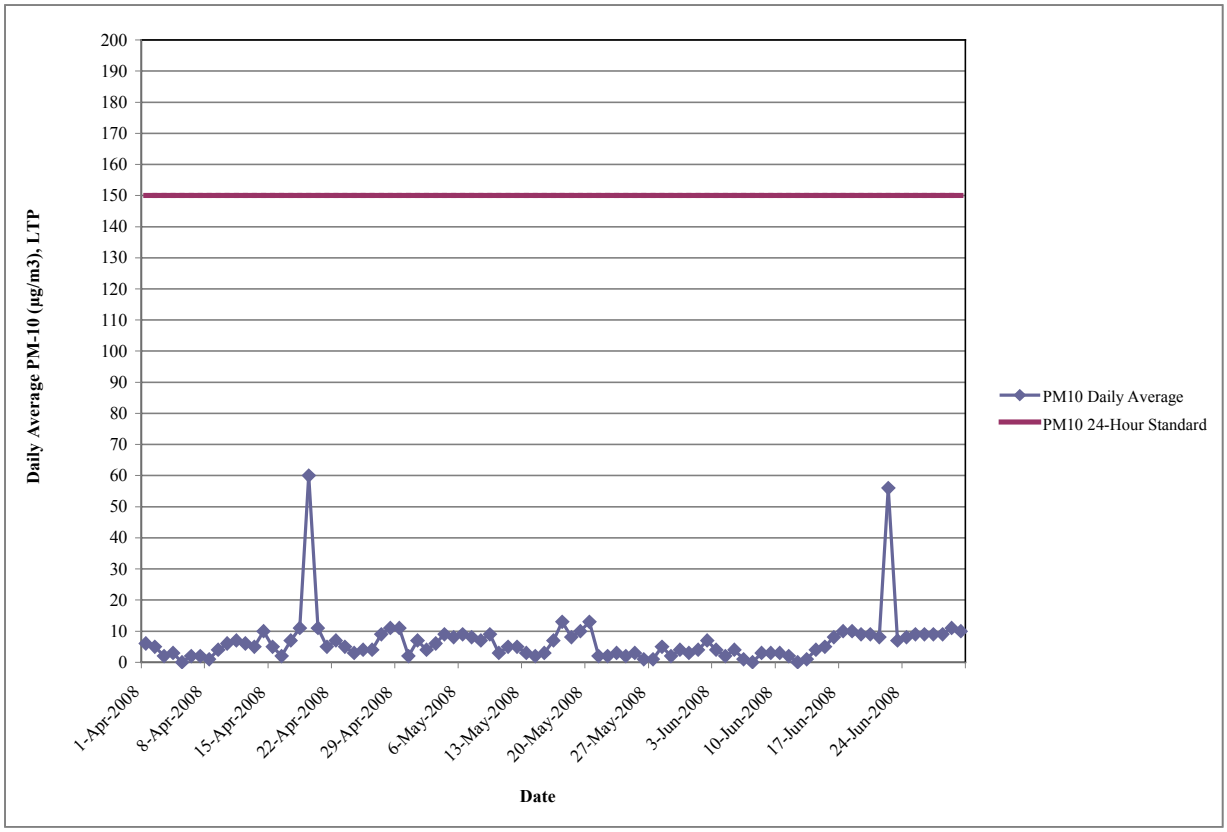

FIGURE 3 - WARM SPRINGS SITE DAILY AVERAGE PM10 CONCENTRATION

3.0 COLLOCATED PM10 RESULTS COMPARISON

Daily average (24-hour) results from the ADLC E-BAM PM10 monitor at the Opportunity site were compared to the Atlantic Richfield Wedding PM10 monitors at the South Site for the quarter. The ADLC monitor collects screening level data, while the Atlantic Richfield monitors follow a federal reference method (FRM) required for compliance with air quality standards.

Collocated PM10 precision criteria allow for a difference between samplers of 5 µg/m^3 at concentrations below 80 µg/m^3, and ±7% for higher concentrations (EPA 1998). The data satisfied these criteria for 28 of the 30 collocated sampling dates. On the other two collocated dates, the concentrations for the ADLC sampler were 7 and 8 µg/m^3, versus zero for the Atlantic Richfield sampler. While this difference exceeds the collocated precision criteria, it is not inconsistent with differences occasionally observed during previous quarters.

For the entire data set, the average difference between the monitors was 1 µg/m^3 with a range of plus (+) 8 to minus (-) 4 µg/m^3. The average absolute difference was 2 µg/m^3. Individual collocated results are listed in Table 1, and depicted graphically in Figure 4. They indicate generally good agreement of PM10 values between the ADLC and Atlantic Richfield monitors.

TABLE 1 – COLLOCATED RESULTS FOR PM10 DAILY AVERAGE VALUES SECOND QUARTER 2008

(All values are µg/m^3 at Local temperature and pressure (LTP))

Date	Standard ARCO Wedding FRM South Site	Test ADLC Met One E-BAM Opportunity Site	Difference (ug/m^3)	Absolute Difference (ug/m^3)	Difference (%)	Absolute Difference (%)	Relative Percent Difference (%)
April 3, 2008	4	3	-1	1	-25	25	29
April 6, 2008	4	1	-3	3	-75	75	120
April 9, 2008	5	5	0	0	0	0	0
April 12, 2008	8	7	-1	1	-13	13	13
April 15, 2008	4	7	3	3	75	75	55
April 18, 2008	8	12	4	4	50	50	40
April 21, 2008	3	7	4	4	133	133	80
April 24, 2008	0	5	5	5	(A)	(A)	200
April 27, 2008	10	9	-1	1	-10	10	11
April 30, 2008	1	4	3	3	300	300	120
May 3, 2008	5	7	2	2	40	40	33
May 6, 2008	9	9	0	0	0	0	0
May 9, 2008	4	9	5	5	125	125	77
May 12, 2008	4	5	1	1	25	25	22
May 15, 2008	3	4	1	1	33	33	29
May 18, 2008	11	9	-2	2	-18	18	20
May 21, 2008	6	3	-3	3	-50	50	67
May 24, 2008	2	4	2	2	100	100	67
May 27, 2008	4	2	-2	2	-50	50	67
May 30, 2008	4	4	0	0	0	0	0
June 2, 2008	6	8	2	2	33	33	29
June 5, 2008	5	4	-1	1	-20	20	22
June 8, 2008	4	2	-2	2	-50	50	67
June 11, 2008	4	0	-4	4	-100	100	200
June 14, 2008	6	5	-1	1	-17	17	18
June 17, 2008	9	9	0	0	0	0	0
June 20, 2008	0	7	7	7	(A)	(A)	200
June 23, 2008	0	8	8	8	(A)	(A)	200
June 26, 2008	8	8	0	0	0	0	0
June 29, 2008	12	12	0	0	0	0	0

Mean	1	2	18	50	59
Maximum	8	8			

(A) Denotes percent differences cannot be calculated because the reference value (ARCO result) is zero.

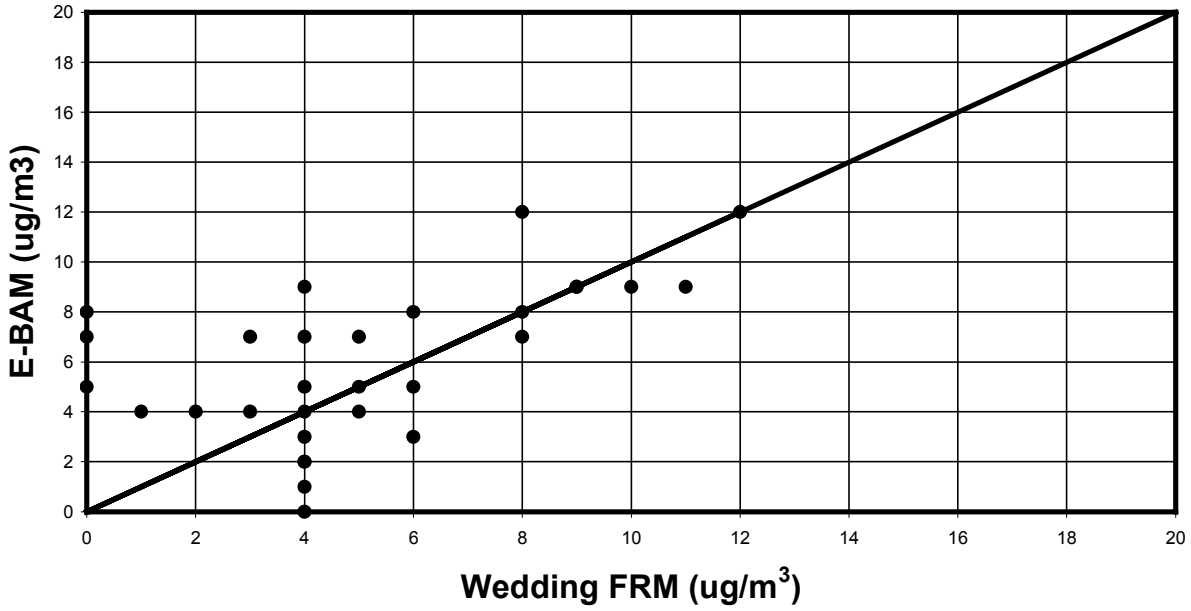

FIGURE 4 – COLLOCATED PM10 RESULTS COMPARISON FOR ADLC OPPORTUNITY E-BAM AND ATLANTIC RICHFIELD WEDDING FRM

4.0 METEOROLOGICAL DATA SUMMARY

Meteorological data were collected continuously and recorded hourly at both the Opportunity and Warm Springs E-BAM monitoring sites. Parameters monitored include wind direction, wind speed, temperature and relative humidity. The data were collected at a height of approximately eight feet above ground level.

Summarized meteorological data for these sites are presented and discussed in Sections 4.1 and 4.2. Detailed daily meteorological summaries are presented in Attachment A; information presented includes:

- Average, maximum and minimum air (shade) temperature for each day,
- Average and maximum hourly average wind speed for each day,
- Resultant wind direction for each day (weighted by wind speed – this is the mean direction from which the wind was blowing), and
- Average daily relative humidity.

Additionally, the summaries in Attachment 1 show the average daily and maximum daily PM10 concentrations, to facilitate correlation with the meteorological data.

Section 4.3 presents wind rose summaries for periods with elevated PM10 concentrations.

4.1 Opportunity Site

Figure 5 summarizes the meteorological data for the Opportunity site. Winds were generally light, averaging 2.3 m/s (5.1 mph). The highest recorded hourly wind speed was 7.7 m/s (17.2 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were below normal in April, and near normal in May and June. Monthly averages were 1.2°C (34.2°F) in April, 8.7°C (47.7°F) in May and 12.7°C (54.9°F) in June. Temperature extremes ranged from a low of –16.1°C (3.0°F) in April to a high of 32.8°C (91.0°F) in June. The average humidity for the quarter was 56%, with considerable daily variation.

Winds at the Opportunity site were mostly from the southwest quadrant, though west-northwesterly winds also were very common. Northerly and north-northeasterly winds were also frequent. The strongest winds tended to be from westerly and north-northeasterly directions. The wind direction distribution for the second quarter differed considerably from previous quarters, when a more pronounced emphasis on southwesterly winds was typical. The spring of 2008 was quite stormy, with many strong frontal passages, which probably accounted for the frequent – and often strong – west-northwesterly winds observed during the second quarter.

Minor meteorological data losses occurred due to routine maintenance. Additionally, eleven hours of wind speed and wind direction data in late April were invalidated due to icing of the instruments.

Part 1 – Means and Extremes

Parameter	April	May	June	Quarter
Average Wind Speed, m/s	2.5	2.3	2.1	2.3
Maximum (hourly) Wind Speed, m/s	7.7	6.4	7.4	7.7
Average Temperature, °C	1.2	8.7	12.7	7.5
Maximum Temperature, °C	20.2	27.7	32.8	32.8
Minimum Temperature, °C	-16.1	-7.4	-0.3	-16.1
Average Relative Humidity, %	56.0	57.6	53.4	55.7
Refer to Attachment A for detailed daily meteorological summaries.				

Part 2 – Quarter 2, 2008 Wind Rose

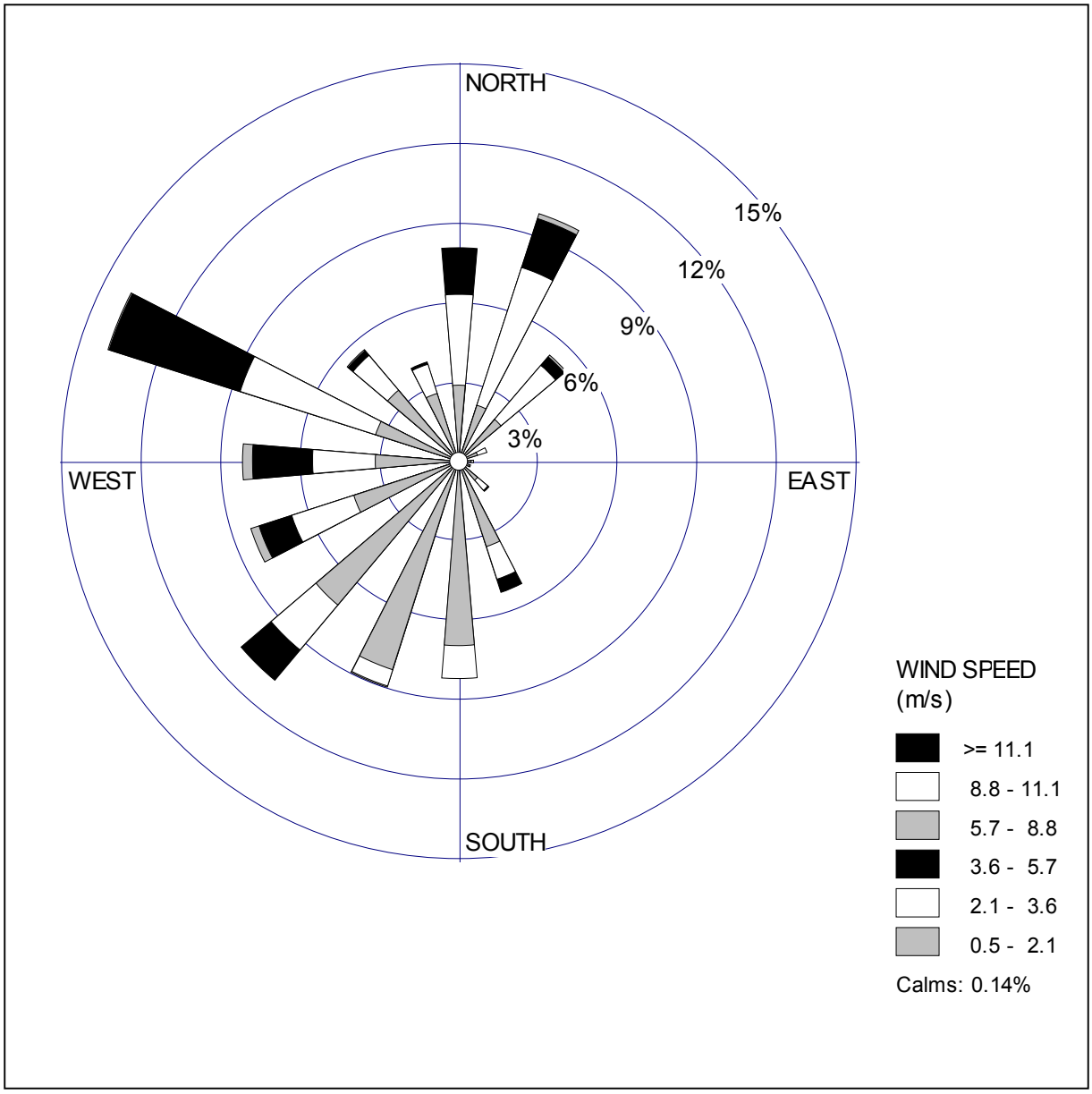

FIGURE 5 – METEOROLOGICAL SUMMARY FOR OPPORTUNITY SITE

4.2 Warm Springs Site

Figure 6 summarizes the meteorological data for the Warm Springs site. Winds were generally light, averaging 2.1 m/s (4.7 mph). The highest recorded hourly wind speed was 7.3 m/s (16.3 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were below normal in April, and near normal in May and June. Monthly averages were 1.0°C (33.8°F) in April, 9.0°C (48.2°F) in May and 13.1°C (55.6°F) in June. Temperature extremes ranged from a low of –19.3°C (-2.7°F) in April to a high of 32.7°C (90.9°F) in June. The average humidity for the quarter was 58%, with considerable daily variation.

Winds at the Warm Springs site were mostly from northerly and southerly directions. However, westerly winds were more common this quarter when compared with previous quarters, and tended to be the strongest. The higher frequency of westerly winds was probably related to the frequent stormy conditions and strong frontal passages that occurred during the spring of 2008.

Minor meteorological data losses occurred due to routine maintenance. Additionally, 54 hours of wind data were invalidated during April because of instrument icing caused by wet snow events.

Part 1 – Means and Extremes

Parameter	April	May	June	Quarter
Average Wind Speed, m/s	2.3	1.9	1.9	2.1
Maximum (hourly) Wind Speed, m/s	7.0	7.3	7.2	7.3
Average Temperature, °C	1.0	9.0	13.1	7.7
Maximum Temperature, °C	22.5	27.1	32.7	32.7
Minimum Temperature, °C	-19.3	-10.1	0.2	-19.3
Average Relative Humidity, %	58.0	59.1	55.9	57.7
Refer to Attachment A for detailed daily meteorological summaries.				

Part 2 – Quarter 2, 2008 Wind Rose

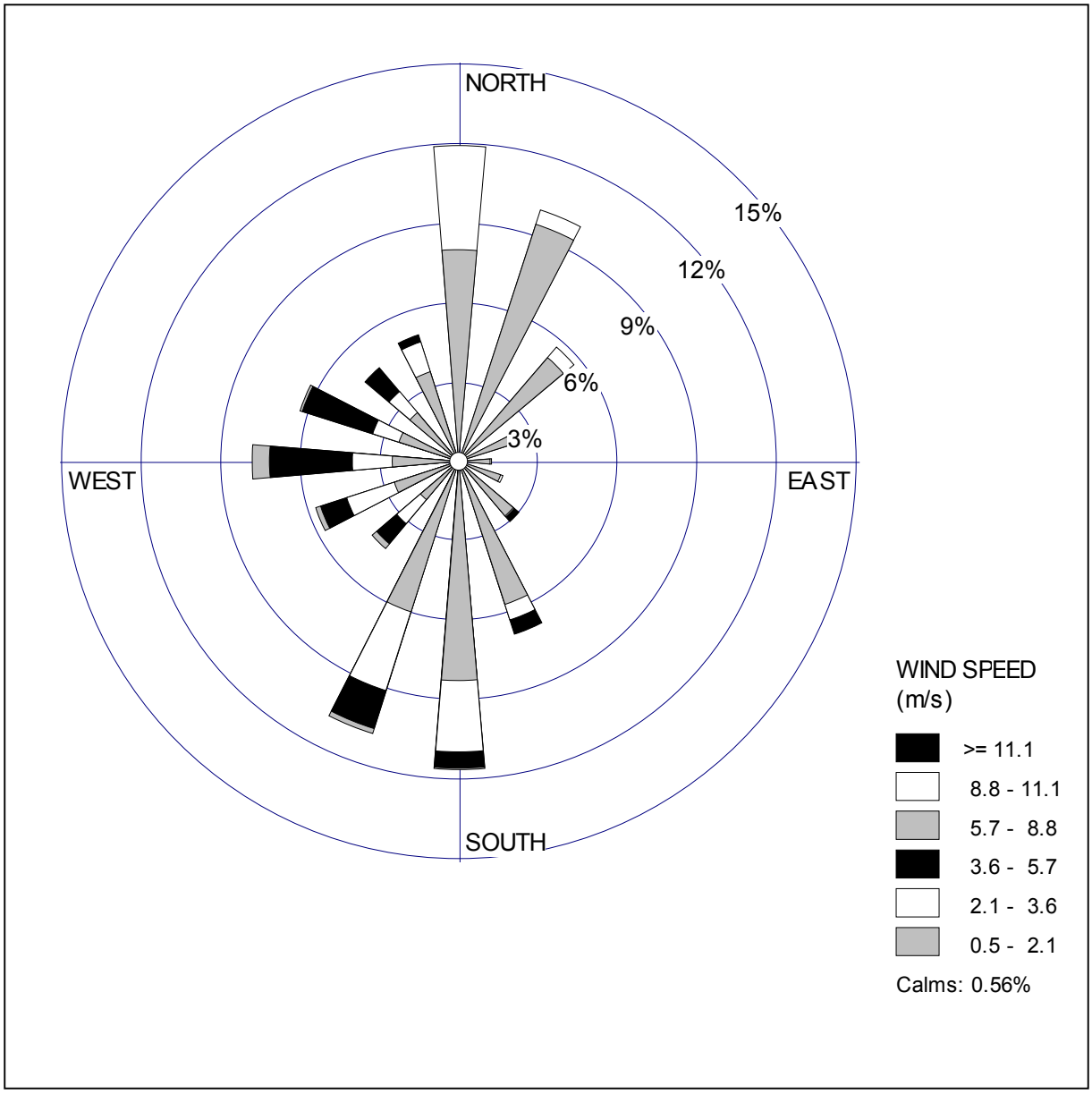

FIGURE 6 – METEOROLOGICAL SUMMARY FOR WARM SPRINGS SITE

4.3 Meteorological Conditions and PM10 Concentrations

Additional wind roses were generated for both monitoring sites to depict wind patterns during periods of elevated PM10 concentrations; they are shown in Figure 7 (Opportunity) and Figure 8 (Warm Springs). For this analysis, "elevated" was defined as concentrations of 20 $\mu g/m^3$ or greater. This threshold – equal to approximately three times the average quarterly concentration – was used to ensure that a sufficient volume of data was incorporated to produce meaningful wind rose results.

When comparing the wind roses for the Opportunity site (Figures 5 and 7), it is evident that wind speeds were not necessarily higher during elevated particulate conditions. However, there was a much higher frequency of southwesterly winds, which tended to be light. During elevated particulate conditions, northerly and north-northeasterly winds were somewhat more common, and tended to be stronger than at other times. This could reflect transport of windblown dust from the Opportunity tailings area. Interestingly, the often-strong west northwesterly winds that were common during this quarter were not associated with high particulate readings.

The corresponding wind roses for the Warm Springs site (Figures 6 and 8) do not show any large differences between elevated particulate conditions and other times. The high particulate levels during northerly winds are probably not related to tailings areas (which would be downwind at those times), but may result from entrainment of dust from the Montana State Hospital facility grounds and a nearby residential area.

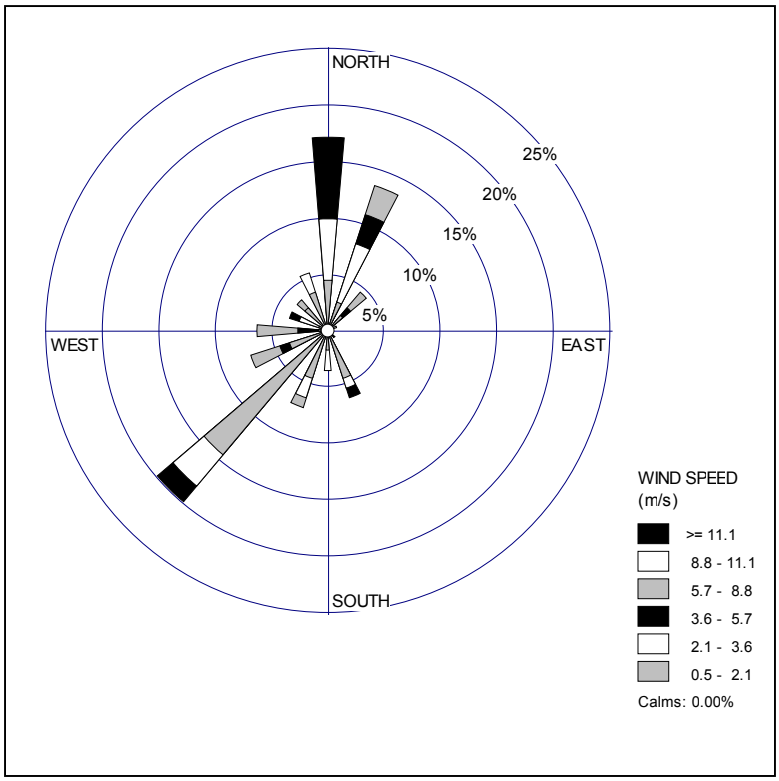

FIGURE 7 – OPPORTUNITY WIND ROSE FOR ELEVATED PM10 PERIODS

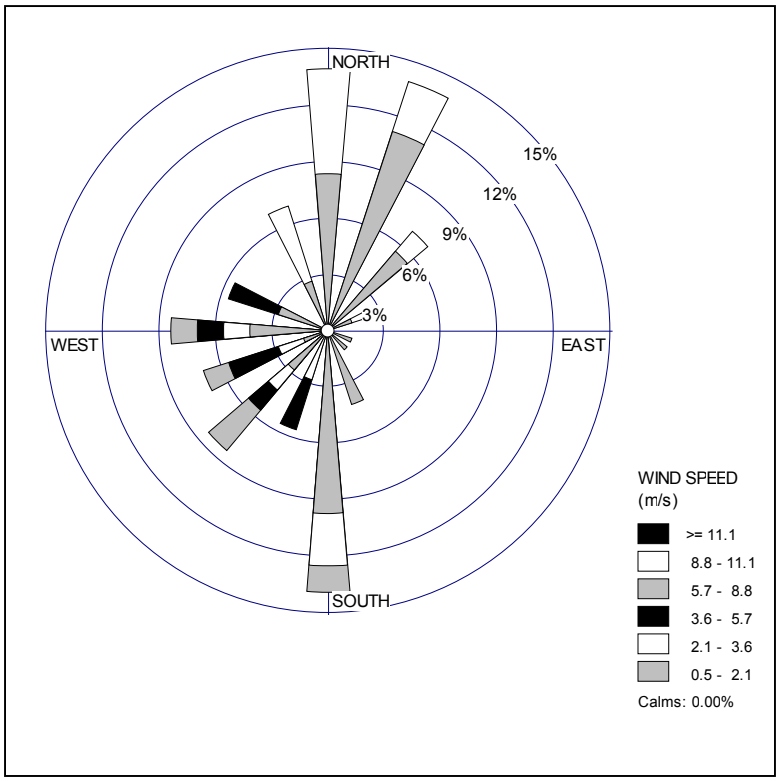

FIGURE 8 – WARM SPRINGS WIND ROSE FOR ELEVATED PM10 PERIODS

5.0 DATA QUALITY SUMMARY

Data quality is an integral part of any ambient monitoring program. The data collected must be of a known quality to be used for evaluation of local air quality and meteorological characteristics. This is particularly important when an objective of a monitoring program is to identify possible emission sources, and meteorological events associated with certain ambient air quality conditions – in this case, elevated inhalable particulate (PM10) levels.

The Opportunity and Warm Springs monitoring systems were checked and/or calibrated (as appropriate for each monitoring parameter) monthly during the second quarter of 2008. This was accomplished via performance checks using standards that were either:

- Traceable to NIST; or
- Otherwise certified by the test equipment manufacturer.

Each instrument response was recorded, and evaluated to determine whether it fell within its respective acceptance range. In the event that a response fell outside (or near the limits of) the applicable acceptance range, the monitor or sensor in question was adjusted or recalibrated as appropriate. Such results then must be evaluated, in conjunction with a detailed data review, to identify data periods that must be flagged or invalidated.

Minor sampler maintenance was also performed on a monthly basis. Additionally, data were reviewed frequently via satellite link, and inspected for any suspicious behavior requiring investigation.

5.1 Summary of Performance Check / Maintenance Activities

Performance checks and minor maintenance were conducted on a monthly basis. Table 2 summarizes checks and maintenance for the E-BAM sampler itself, while Table 3 lists the meteorological checks. Information presented includes:

- The instrument model and serial number for each component of the monitoring system;
- Each type of check/maintenance performed on that component;
- Performance acceptance ranges; and
- A description of the calibration standard (and its traceability) used to perform each check.

5.2 Data Quality Issues

In general, performance checks and maintenance activities conducted throughout the second quarter of 2008 indicted that the E-BAM samplers were meeting performance objectives. The performance check procedures, routine maintenance activities and results are discussed in detail in Attachment B. All results obtained during the second quarter of 2008 were satisfactory. However, a minor adjustment was made to the calibration of the temperature sensor at Warm Springs on April 14.

On June 13 at the Warm Springs site, pinholes were noted on the sampling tape, indicating material deposits on the sampling vane or nozzle. A leak check was performed, giving a result of 1.8 LPM – slightly exceeding the manufacturer's limit of 1.5 LPM. However, a check of the flow at the sampler intake gave a result of 16.43 LPM, well within the manufacturer specification of 16.7 LPM +/- 2%. This demonstrated that the flow through both the PM10 orifice and the sampling tape was acceptable, so no data were invalidated. The problem was corrected immediately by cleaning the vane and nozzle surfaces, and did not recur. Subsequent flow and leak checks were well within the acceptance ranges.

Minor data losses occurred at both monitoring sites during the second quarter of 2008, including the following:

- On May 9 at Opportunity, seven hours of PM10 data were lost due to a sampler flow failure.
- On April 19, 20, 21 and 24, a total of 54 hours of wind data were invalidated at the Warm Springs site due to icing of the wind instruments during wet snow events.
- On April 23 and 24, a total of 11 hours of wind data were invalidated at the Opportunity site due to icing of the wind instruments during a wet snow event.
- Additional minor data losses occurred due to routine maintenance.

No unexplainably high PM10 readings occurred at either site during the second quarter of 2008.

TABLE 2 – SUMMARY OF PERFORMANCE CHECKS E-BAM SAMPLER

Met One E-BAM PM_{10} Sampler

Instrument	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
PM_{10} Sampler	E-BAM	F7290	F7289	Leak Check	<1.5 LPM	BX-302 valve	N/A
				Operating Flow	+/- 2% (+/- 0.33 LPM)	Delta Cal S/N 000498	MFR/NIST
				Pump Test	(1)	BX-302 valve	N/A
				Zero/Span	Pass / Fail	Membrane Plates	MFR
				Clean Vane & Nozzle	(2)	N/A	N/A
				Clean PM10 Head	N/A	N/A	N/A
Barometer (3)	E-BAM	F7290	F7289	Collocated	+/- 2 mmHg	Aneroid Barometer	Mercury Barometer

Explanatory Notes for Table 2

N/A = Not applicable
MFR/NIST = Certified traceable to NIST by the manufacturer
MFR = Certified accurate per Met One's E-BAM-6100 Final Test Procedure
(1) Acceptance range varies with test flow rate, see Attachment B for discussion.
(2) Leak check performed following cleaning, result must be <1.5 LPM.
(3) Barometer is internal to E-BAM sampler.

TABLE 3 – SUMMARY OF PERFORMANCE CHECKS METEOROLOGICAL INSTRUMENTS

Met One Meteorological Instruments

Instrument (1)	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
Temperature	9250	F9487	F9481	Collocated	+/- 0.5 °C	Assmann Psychrometer	NIST
Relative Humidity	593	F9346	F9349	Collocated	+/- 5% Relative Humidity	Assmann Psychrometer	NIST
Wind Speed	0348	G2181	G2187	Collocated	+/- 0.5 m/s	Met One 010 Sensor	NIST
				Rotation Check	+/- 0.2 m/s	Synchronous Motor	MFR
Wind Direction	0348	G2181	G2187	Initial Alignment	+/- 2 degrees	Solar Sighting	NIST Time
				Linearity	+/- 3 degrees	Visual Crossarm Alignment (2)	N/A

Explanatory Notes for Table 3

(1) All meteorological instruments include certificate of NIST traceability from Met One, valid for a period of one year.
(2) Linearity checked by visually aligning wind vane in 90-degree increments with respect to crossarm.

MFR = Motor rotation rate provided by manufacturer.

6.0 AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES

Invalid hours for the quarter are summarized in Table 4 for the Opportunity site and Table 5 for the Warm Springs site. The complete PM10 data set for the quarter, and current qualifier codes are presented in Attachment C.

TABLE 4 – OPPORTUNITY SITE INVALID DATA PERIODS QUARTER 2, 2008

Part A – PM10

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
4-4-2008	1500	2200	Tape change	BA
4-17-2008	1500	2200	Monthly checks	BA
4-21-2008	1200	1900	Adjust tape alignment	BA
5-5-2008	1000	1700	Tape change	BA
5-9-2008	1000-1600	1700-2300	Flow failure	AN
5-16-2008	1400	2100	Monthly checks	BA
6-1-2008	1300	2000	Tape change	BA
6-19-2008	1300	2000	Sanding trailer deck	BA
6-25-2008	1600	2300	Monthly checks	BA

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
4-17-2008	1400	2100	Monthly checks	BA
4-23-2008	2300		Instrument icing	AO
4-24-2008	0000-0900	0600-1600	Instrument icing	AO
5-16-2008	1300	2000	Monthly checks	BA
6-25-2008	1600	2300	Monthly checks	BA

Part C – Temperature / Relative Humidity

No invalid data during Quarter 2, 2008

TABLE 5 – WARM SPRINGS SITE INVALID DATA PERIODS QUARTER 2, 2008

Part A – PM10

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
4-7-2008	1300	2000	Tape change	BA
4-14-2008	1500	2200	Adjust temperature calibration	BA
4-17-2008	1300-1400	2000-2100	Monthly checks	BA
5-5-2008	1000	1700	Tape change	BA
5-16-2008	1200	1900	Monthly check	BA
5-18-2008	0800	1500	No data recorded	AN
6-1-2008	1200	1900	Tape change	BA
6-13-2008	1600	2300	Clean vane / nozzle	BA
6-19-2008	1100	1800	Sanding trailer deck	BA
6-25-2008	1400	2100	Monthly checks	BA

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
4-17-2008	1300	2000	Monthly checks	BA
4-19-2008	1400-2300	2100-2300	Instrument icing	AO
4-20-2008	0000-2300	0000-2300	Instrument icing	AO
4-21-2008	0000-0900	0000-1600	Instrument icing	AO
4-24-2008	0000-0900	0700-1600	Instrument icing	AO
5-16-2008	1300	2000	Monthly checks	BA
5-18-2008	0800	1500	No data recorded	AN
6-25-2008	1400	2100	Monthly checks	BA

Part C – Temperature / Relative Humidity

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
4-14-2008 (temperature only)	1500	2200	Adjusted temperature calibration	BA
5-18-2008	0800	1500	No data recorded	AN

7.0 REFERENCES

EPA. August 1998. EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Part 1, Ambient Air Quality Monitoring Program Quality System Development. EPA-45a/R-98-004.

ATTACHMENT A

METEROLOGICAL SUMMARY SHEETS
SECOND QUARTER 2008

OPPORTUNITY DAILY DATA SUMMARY - APRIL 2008

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	6	21	1.8	4.8	241	-6.2	-0.5	-11.8	65
2	3	23	1.6	3.0	252	-4.4	1.2	-11.1	62
3	3	10	2.4	3.8	243	-0.2	8.6	-9.9	45
4	4	21	2.6	5.1	217	2.2	10.5	-3.7	51
5	1	19	3.0	4.9	287	-1.4	2.2	-6.9	59
6	1	13	2.2	4.4	236	-1.9	4.3	-8.3	61
7	5	22	2.0	4.4	18	-0.7	4.7	-7.7	64
8	2	10	2.2	4.7	194	-0.1	5.1	-6.1	51
9	5	20	2.0	5.4	312	-0.5	6.2	-6.8	62
10	5	17	2.7	4.8	304	-0.8	4.0	-4.5	63
11	4	16	3.1	4.8	282	2.6	8.6	-3.4	49
12	7	20	1.7	3.7	35	4.6	13.7	-4.3	56
13	6	17	2.9	6.0	211	10.1	20.2	-0.2	43
14	14	106	3.5	7.5	221	12.8	20.2	0.9	33
15	7	25	3.4	5.5	313	-0.1	4.1	-2.7	59
16	4	15	3.1	4.9	285	-0.2	4.4	-4.5	52
17	8	17	2.8	4.6	250	5.6	13.5	-1.0	45
18	12	24	2.7	6.1	258	5.2	13.9	-3.6	52
19	39	148	2.6	6.6	13	-4.2	1.3	-11.3	79
20	23	64	2.2	5.0	356	-11.9	-7.5	-14.6	72
21	7	17	2.3	6.4	224	-6.9	-1.6	-16.1	65
22	5	21	2.8	5.5	236	-0.3	7.6	-6.9	58
23	7	25	1.7	3.8	7	0.0	4.1	-4.4	80
24	5	19	2.8	4.9	279	1.2	6.5	-3.1	67
25	2	22	2.8	5.4	270	0.3	3.9	-3.2	61
26	6	18	2.3	4.1	332	2.5	9.5	-3.0	50
27	9	22	2.1	4.2	206	7.0	17.8	-3.8	39
28	14	25	2.1	4.1	212	11.2	19.9	3.0	36
29	28	372	3.5	7.7	261	8.1	19.3	-0.4	50
30	4	21	2.5	4.7	308	1.3	6.3	-1.8	52

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

OPPORTUNITY DAILY DATA SUMMARY - MAY 2008

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	3	8	2.3	5.8	323	1.7	8.5	-7.4	44
2	6	15	1.4	2.2	23	4.0	12.9	-6.2	44
3	7	15	2.1	3.5	36	7.0	14.2	-4.5	43
4	8	22	1.6	3.3	19	8.0	14.9	-1.2	49
5	9	17	2.3	3.5	242	10.3	19.8	-1.6	43
6	9	24	2.3	4.4	25	9.1	14.5	1.8	52
7	9	33	1.3	2.8	356	5.1	6.8	2.5	80
8	6	18	2.2	3.6	285	6.2	11.6	0.9	51
9	9	39	2.2	5.0	354	2.9	5.8	-0.6	59
10	5	22	2.1	4.6	219	5.9	13.7	-4.7	51
11	7	33	3.4	6.4	296	7.1	10.8	2.3	46
12	5	22	2.2	4.0	323	3.2	8.6	-1.7	61
13	4	21	2.7	4.8	265	6.5	14.4	-3.3	50
14	0 (9)	8	2.5	4.6	312	8.5	13.3	4.9	66
15	4	30	2.0	4.3	39	11.8	20.6	1.0	59
16	8	20	1.9	3.8	91	14.6	25.5	2.7	48
17	11	19	1.7	2.8	99	17.2	27.7	4.0	35
18	9	18	3.1	5.5	271	19.9	25.6	11.7	32
19	9	25	2.2	4.1	274	17.0	24.3	7.5	40
20	15	97	3.4	6.3	199	16.9	27.0	5.9	42
21	3	21	2.9	4.3	309	6.0	7.7	2.6	58
22	2	14	3.3	4.8	10	3.3	5.5	1.6	86
23	2	20	2.8	4.4	9	5.5	7.9	3.2	82
24	4	34	1.6	3.3	2	6.7	8.7	4.7	85
25	4	23	2.4	5.1	9	6.9	10.7	4.0	78
26	3	35	3.2	5.4	12	7.3	9.5	5.4	75
27	2	10	1.5	2.8	31	7.9	13.3	2.9	67
28	5	28	2.1	4.4	187	9.5	17.3	-0.2	65
29	3	10	2.0	4.4	247	10.5	14.9	4.5	66
30	4	24	1.7	3.4	108	10.3	16.5	5.4	70
31	2	11	1.8	3.6	134	12.7	20.7	4.2	58

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds
(9) Negative value detected, zero reported

OPPORTUNITY DAILY DATA SUMMARY - JUNE 2008

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	3	14	1.8	3.3	188	11.0	19.6	6.0	71
2	8	50	2.5	7.4	256	9.4	17.2	4.2	67
3	5	27	2.0	3.9	277	9.3	16.7	0.1	57
4	2	15	1.8	3.3	314	4.7	6.5	3.1	85
5	4	17	1.5	3.8	356	9.1	15.1	5.3	76
6	2	20	3.1	5.0	302	6.8	10.6	3.7	61
7	1	11	2.7	4.3	281	6.0	10.3	1.8	56
8	2	9	2.5	4.8	292	7.8	13.0	3.4	60
9	3	19	2.0	3.6	239	8.4	16.2	-0.2	64
10	4	20	2.9	6.1	292	4.6	9.4	1.0	64
11	0 (9)	13	2.8	4.7	280	2.9	5.0	0.9	77
12	1	9	3.3	5.4	283	7.5	12.8	3.2	61
13	3	10	2.8	4.4	261	12.4	19.6	3.0	48
14	5	14	2.1	3.4	288	13.4	20.8	4.4	42
15	6	14	2.0	3.7	13	12.3	21.4	-0.3	46
16	11	59	1.8	3.2	358	15.1	25.0	2.0	44
17	9	26	2.2	5.4	259	16.8	26.1	5.4	41
18	9	16	2.1	4.3	3	14.3	21.7	4.1	45
19	8	20	1.5	3.0	356	12.7	21.7	1.0	50
20	7	27	1.5	2.6	232	15.9	26.3	2.6	44
21	8	21	2.2	3.5	215	20.5	30.3	10.4	37
22	6	29	2.2	3.9	347	17.8	23.3	12.7	50
23	8	18	1.9	3.9	244	16.5	25.0	5.6	45
24	7	17	2.2	4.2	20	15.7	24.0	6.5	46
25	10	23	1.6	4.1	5	15.1	25.4	2.3	47
26	8	17	2.3	4.4	299	15.8	23.6	5.2	44
27	11	54	2.3	4.4	29	16.4	23.5	6.2	47
28	11	31	1.5	3.1	353	17.6	28.4	4.9	49
29	12	25	1.9	4.0	287	21.9	32.8	6.6	44
30	14	37	1.8	3.9	203	24.1	32.8	16.6	35

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds
(9) Negative value detected, zero reported

WARM SPRINGS DAILY DATA SUMMARY - APRIL 2008

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	6	35	2.0	4.4	203	-6.9	-0.5	-12.9	66
2	5	16	1.6	2.5	156	-5.5	2.5	-13.2	65
3	2	12	2.0	4.4	202	-0.8	9.1	-10.7	49
4	3	16	3.0	6.4	208	2.7	12.1	-3.7	51
5	0	16	2.4	4.5	263	-2.0	1.9	-7.2	64
6	2	19	2.2	3.9	210	-2.3	6.2	-9.9	63
7	2	16	1.6	3.2	135	-1.1	5.7	-10.0	65
8	1	13	2.1	4.3	180	-0.4	6.6	-6.4	53
9	4	13	1.8	4.7	312	-0.4	7.5	-8.9	61
10	6	28	1.7	5.5	307	-1.7	3.6	-8.5	70
11	7	18	1.6	3.8	319	1.2	9.8	-7.6	57
12	6	20	1.2	2.1	14	4.1	15.6	-7.8	60
13	5	12	3.2	6.5	198	11.1	22.3	-3.7	44
14	10	30	4.2	6.8	193	13.8	22.5	1.5	32
15	5	24	2.8	5.2	323	0.2	4.8	-3.1	60
16	2	13	3.6	5.3	258	0.0	4.6	-5.6	53
17	7	18	3.7	6.6	256	6.1	14.2	0.4	44
18	11	47	2.4	6.0	240	4.5	13.5	-3.9	56
19	60	256	1.2	2.6	358	-4.3	1.4	-11.8	80
20	11	50	NO DATA	NO DATA	NO DATA	-12.1	-7.6	-15.0	75
21	5	24	2.8	4.5	200	-7.7	-0.3	-19.3	67
22	7	24	1.9	3.5	177	-0.3	7.3	-8.3	60
23	5	20	1.4	2.5	10	0.3	4.8	-4.1	80
24	3	15	2.3	4.2	283	1.5	6.5	-3.6	65
25	4	43	2.4	5.5	263	0.3	5.0	-3.8	65
26	4	18	2.2	4.5	293	3.3	10.6	-2.5	49
27	9	17	1.7	4.0	189	7.0	18.2	-3.8	44
28	11	22	2.4	4.1	197	11.4	19.9	3.9	37
29	11	23	3.0	7.0	216	8.4	20.2	-0.9	50
30	2	15	2.2	5.7	320	1.0	5.4	-3.8	54

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - MAY 2008

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	7	26	1.8	3.2	351	1.2	8.4	-10.1	49
2	4	13	1.2	2.0	117	4.0	13.4	-7.2	48
3	6	24	1.6	2.9	62	7.4	15.1	-2.8	45
4	9	21	1.3	2.7	12	8.0	15.7	-0.8	52
5	8	16	2.3	3.6	222	10.6	19.4	0.1	44
6	9	20	1.6	3.2	1	9.4	15.4	2.5	54
7	8	20	1.1	1.9	17	5.7	8.4	3.1	81
8	7	21	2.8	5.6	288	6.7	12.5	1.1	51
9	9	21	1.6	3.6	11	3.4	7.2	-0.1	59
10	3	15	2.4	5.1	206	6.4	15.0	-3.8	52
11	5	15	2.9	6.3	288	7.5	11.2	2.1	47
12	5	17	1.2	1.9	45	3.0	8.5	-3.6	64
13	3	13	3.3	6.4	252	6.9	14.3	-3.4	51
14	2	21	2.0	4.8	340	8.4	13.0	3.8	69
15	3	13	1.4	2.0	24	11.8	20.9	0.7	60
16	7	16	1.5	2.1	111	14.8	24.8	3.3	49
17	13	23	1.4	2.0	111	17.1	27.1	4.0	37
18	8	27	3.7	7.3	257	19.7	25.4	11.6	33
19	10	30	2.8	5.5	259	17.1	24.3	8.6	41
20	13	108	3.2	6.4	183	17.6	27.1	6.1	43
21	2	12	2.3	4.9	319	6.1	8.9	2.8	64
22	2	20	1.9	3.2	11	3.7	6.0	1.6	87
23	3	19	1.9	3.4	0	6.2	9.2	3.6	82
24	2	18	1.0	1.5	28	7.2	9.4	4.6	87
25	3	14	1.5	3.1	8	7.7	11.7	4.4	78
26	1	20	2.0	3.6	7	8.2	11.1	6.0	72
27	1	10	1.2	2.2	352	8.5	14.3	2.8	67
28	5	30	1.9	4.3	174	10.4	19.2	0.3	65
29	2	18	1.9	2.9	192	11.4	16.7	4.8	68
30	4	23	1.2	2.8	358	10.3	16.3	4.1	76
31	3	20	1.9	3.7	179	13.3	21.4	3.9	61

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - JUNE 2008

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	4	19	1.6	3.3	154	11.8	20.0	6.2	72
2	7	36	2.0	7.2	231	9.9	18.8	4.1	70
3	4	24	2.2	5.1	278	10.0	17.6	0.3	58
4	2	17	1.0	2.1	156	5.3	7.4	3.5	87
5	4	15	1.3	2.6	359	9.7	16.4	5.8	76
6	1	13	2.8	5.7	276	7.2	11.2	3.8	63
7	0 (9)	5	3.4	5.4	272	6.5	11.0	2.6	57
8	3	19	2.6	4.9	281	7.9	14.2	3.2	64
9	3	17	2.0	4.8	198	8.9	16.2	0.7	67
10	3	30	2.1	5.5	320	4.4	9.3	0.2	71
11	2	16	2.8	5.1	252	3.0	5.2	0.2	79
12	0 (9)	7	2.8	5.6	281	7.8	13.6	2.4	64
13	1	9	3.1	5.6	241	13.1	20.5	5.2	50
14	4	15	2.9	5.5	286	13.9	21.9	3.5	44
15	5	14	1.6	2.4	354	13.1	22.3	2.0	47
16	8	18	1.5	2.8	5	15.5	25.6	4.2	47
17	10	19	2.1	5.2	238	17.5	27.2	7.5	41
18	10	22	1.3	2.5	9	14.4	22.8	3.8	49
19	9	22	1.2	2.1	30	13.5	23.0	2.1	52
20	9	53	1.5	2.5	179	16.7	27.1	5.5	39
21	8	36	1.8	3.1	179	20.5	29.9	9.9	40
22	56	1128	1.5	3.8	356	17.8	23.4	11.6	54
23	7	21	1.6	3.0	200	16.5	25.5	7.9	51
24	8	21	1.3	2.5	10	16.0	24.5	6.3	50
25	9	18	1.2	2.2	356	15.5	26.3	3.8	50
26	9	28	2.4	6.1	291	16.2	24.1	8.4	47
27	9	16	1.4	2.3	37	16.3	24.4	5.6	52
28	9	17	1.3	2.0	317	18.1	28.5	5.3	51
29	11	30	1.8	2.8	190	22.5	32.2	10.4	44
30	10	25	1.8	4.6	205	23.9	32.7	16.0	40

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds
(9) Negative value detected, zero reported

ATTACHMENT B

E-BAM PERFORMANCE CHECK / MAINTENANCE PROCEDURES AND RESULTS SECOND QUARTER 2008

1.1 Performance Check / Maintenance Procedures

1.1.1 E-BAM Sampler

Several checks are performed on the E-BAM sampler, including both its PM10 monitoring system and the internal barometric pressure sensor.

1.1.1.1 Leak Check (E-BAM Manual Section 2.4.1.1)

Each month, the E-BAM sampler is checked for leaks in the sampling train that could compromise data integrity. This check is performed by installing a BX-302 valve/filter assembly in place of the PM10 inlet, and running the sampler in its "pump test" mode while slowly closing the valve. The check is considered satisfactory if the flow drops to below 1.5 LPM.

1.1.1.2 Operating Flow Rate Check (E-BAM Manual Section 2.4.1.5)

The operating flow rate check is performed monthly by installing an NIST-traceable BGI Delta-Cal flow monitor in place of the PM10 inlet, and comparing the indicated flow against the target of 16.7 LPM. The check is considered satisfactory if the indicated flow is within +/- 2% of the target value. Otherwise, the flow is adjusted at set points of 14.0 LPM and 17.5 LPM, and the operating flow re-checked.

A successful operating flow rate check, when preceded by a successful leak check, proves that the E-BAM sampler is collecting valid PM10 data.

1.1.1.3 Pump Test (E-BAM Manual Section 2.4.1.7)

The pump test is performed monthly to verify the robustness of the pump; poor results indicate that the pump is nearing the end of its life. The BX-302 valve/filter assembly is installed in place of the PM10 inlet, and – with the sampler running in the "pump test" mode – partially closed to obtain an indicated flow rate between 14 and 15 LPM. The pump condition pressure reading displayed by the E-BAM then is compared against the appropriate value listed in Figure 34 of the E-BAM manual, providing an evaluation of the pump's condition.

1.1.1.4 Zero/Span Check (E-BAM Manual Section 2.4.3.1)

Zero and span membrane plates supplied with each sampler are used quarterly to check the calibration of the E-BAM sampler's beta attenuation detector (The manual indicates this check is not required until after 6 months of operation). These plates simulate specific particulate loads when used in conjunction with a blank filter tape. The checks are performed within the E-BAM sampler's "membrane test" menu, which directs the user to install and remove the plates at specified times. At the conclusion of the test, the display screen indicates whether the calibration test was successful. The membrane plates are certified by the manufacturer.

1.1.1.5 Clean Valve and Nozzle (E-BAM Manual Section 2.4.5)

The sampler's sample inlet nozzle (located directly above the filter tape) and vane (located directly beneath the filter tape) are cleaned monthly with a modified Q-tip using isopropyl alcohol. Care is taken that no excess alcohol drips into the vane assembly, which could affect the unit's calibration. Immediately after performing this maintenance, the leak check described in Section 1.1.1.1 is repeated to ensure that the sample train integrity was not compromised.

1.1.1.6 Clean PM10 Inlet (E-BAM Manual Appendix H)

Each month the PM10 inlet is removed from the sampler, disassembled and cleaned using paper towels and isopropyl alcohol. Additionally, all o-rings are lubricated with stopcock grease as necessary.

1.1.1.7 Barometric Pressure Sensor Check (E-BAM Manual Section 2.4.1.4)

The E-BAM's internal barometer is checked monthly using a Wallace and Tiernan aneroid barometer that is routinely checked against a mercury wall barometer. If the results agree within +/- 2 mmHg, no adjustment is necessary.

1.1.2 Meteorological Sensors

1.1.2.1 Temperature (E-BAM Manual Section 2.4.1.3)

The E-BAM manual specifies a two-point calibration procedure using an ambient temperature and an ice bath. However, the manufacturer indicated that a single-point field calibration check was generally sufficient. Disassembly of the sensor for placement in an ice bath is not trivial, and is impractical as a routine field activity.

The temperature sensor is checked monthly at ambient conditions using an Assmann Psychrometer that has been certified against an NIST-traceable mercury thermometer. If the readings agree to within 0.5 degrees Celsius, no adjustment is necessary.

1.1.2.2 Relative Humidity (Model 593 Relative Humidity Sensor Operation Manual)

The Model 593 Manual indicates that recalibration (requiring additional specialized equipment) is required only if the sensor element is replaced in the field. Since the entire E-BAM unit will be returned to the manufacturer for annual calibration and maintenance, field replacement of the sensor element is not anticipated. For this project, calibration of the relative humidity sensor will be limited to monthly collocated checks using an Assmann Psychrometer that is certified against an NIST-traceable mercury thermometer. Wet-bulb and dry-bulb temperatures, together with ambient barometric pressure, are used with psychrometric tables to calculate a true relative humidity, which is compared against the E-BAM display. If the indicated relative humidity agrees with that obtained by the Assmann psychrometer to within +/- 5% relative humidity, the results are considered acceptable.

1.1.2.3 Wind Speed (Model 034B Wind Sensor Operation Manual)

The Model 034B Manual recommends an initial check of the unit's response to a known rotation rate. This is being done monthly in the field using a 300 rpm synchronous motor to produce a known wind speed of 18.49 mph (8.27 m/s). The manual specifies an accuracy of +/- 0.25 mph (0.11 m/s) at speeds below 22.7 mph (10.1 m/s). Additionally, the response of the sensor when stopped is observed; it should be 0.3 +/- 0.1 m/s.

1.1.2.4 Wind Direction (Model 034B Wind Sensor Operation Manual)

The manual does not specify routine checks for the wind direction sensor, beyond an initial check to confirm that the sensor's readout increases from 0 to 360 degrees as the shaft is turned clockwise. However, routine checks are performed monthly to verify proper operation. First, the sensor's alignment is verified by locking the sensor in place with its alignment pin, and ensuring that a response of between 178 and 182 degrees is obtained. Next, the sensor's linearity is verified by turning it in 90-degree intervals (using the sensor crossarm as a visual reference), and confirming that the E-BAM display's direction indication changes by 90 +/- 3 degrees with each step.

The initial orientation of the sensor was performed using a solar sighting in conjunction with NIST time (WWV) to establish precise direction azimuths. The use of solar sightings – rather than magnetic compass readings – negates any localized magnetic influences.

1.1.2.5 Filter Temperature and Humidity (E-BAM Manual Sections 2.4.2.1 and 2.4.2.2)

The E-BAM Manual includes provisions for adjusting the response of both of these parameters. However, there is no practical way to measure either parameter with an external reference standard. Therefore, checks of these parameters will be limited to review of downloaded data files for suspicious behavior.

1.2 Performance Check Results

Each set of performance check results is presented in Appendix A. Results obtained during the second quarter of 2008 were satisfactory with the following exceptions:

- Minor adjustments to the temperature sensor calibration were made at Warm Springs on April 14.
- On June 13 at the Warm Springs site, a slight buildup of tape material was noted on the PM10 sampler's vane/nozzle assembly. This resulted in a leak check result of 1.8 LPM – exceeding the manufacturer's limit of 1.5 LPM. This problem and the corrective action taken are discussed in Section 5.2.

APPENDIX A

PERFORMANCE CHECK RESULTS

OPPORTUNITY SITE

	DATE	4/17/2008	5/16/2008	6/25/2008
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1404 MST	1305 MST	1517 MST
	EBAM BACK ON-LINE@	1449 MST	1340 MST	1554 MST
		Monthly Check	Monthly Check	Monthly Check
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	12.8	23.4	26.6
	Audit	13.1	22.7	26.2
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	26%	26%	18%
	Audit (Td/Tw)	13.1 / 4.5	22.7 / 11.7	26.2 / 12.0
	Audit RH	24.5%	27.6%	18.3%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped	0.3	0.3	0.3
	EBAM-Spinning	6.4	1.9	1.1
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated	8.3	8.3	8.3
	Known	8.27	8.27	8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	633.8	641.6	633.8
	Audit	635.3	643.4	634
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	177	177	178
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm	154	153	154
	+90 degrees	244	245	245
	+180 degrees	336	334	333
	+270 degrees	65	66	65
	+360 degrees	156	153	154
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	0.7 LPM	0.7 LPM	0.7 LPM
	Leak repaired?	N/A	N/A	N/A
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.74	16.81	16.89
	As left (if recalibrated)	N/A	N/A	N/A
Flow Calibration - Low Flow (if necessary)	As found	N/A	N/A	N/A
	As left	N/A	N/A	N/A
Flow Calibration - High Flow (if necessary)	As found	N/A	N/A	N/A
	As left	N/A	N/A	N/A
Pump Test (see 2.4.1.7)	Pressure mm Hg	359 @ 14.5	377 @ 14.6	336 @ 14.9
Clean Nozzle (see 2.4.5)	Confirm (X)	X	X	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)	X	X	X
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	Pass (0.334)	N/A	N/A
	Span Pass/Fail	Pass (0.933)	N/A	N/A
Confirm Leak Check (after maintenance)	Result	0.7	0.7	0.7
	Leak repaired?	N/A	N/A	N/A

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

WARM SPRINGS SITE

	DATE	4/17/2008	5/16/2008	6/13/2008
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1206 MST	1105 MST	1502 MST
	EBAM BACK ON-LINE@	1310 MST	1151 MST	1535 MST
		Monthly Check	Monthly Check	(1)
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	11.1	20.9	
	Audit	10.9	20.8	
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	29%	29%	
	Audit (Td/Tw)	10.9 / 3.3	20.8 / 10.8	
	Audit RH	27.9%	29.9%	
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped	0.3	0.3	
	EBAM-Spinning	3.9	1.1	
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated	8.3	8.3	
	Known	8.27	8.27	
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	638.0	645.2	
	Audit	639.6	646.7	
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	179	178	
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm	190	190	
	+90 degrees	281	281	
	+180 degrees	9	13	
	+270 degrees	102	101	
	+360 degrees	191	189	
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	<0.5 LPM	<0.5 LPM	1.8 LPM
	Leak repaired?	N/A	N/A	YES
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.90	17.00	16.43
	As left (if recalibrated)	N/A	16.75	16.74
Flow Calibration - Low Flow (if necessary)	As found	N/A	14.29	N/A
	As left	N/A	14.00	N/A
Flow Calibration - High Flow (if necessary)	As found	N/A	17.85	N/A
	As left	N/A	17.50	N/A
Pump Test (see 2.4.1.7)	Pressure mm Hg	369 @ 14.9	355 @ 14.8	
Clean Nozzle (see 2.4.5)	Confirm (X)	X	X	
Clean PM-10 Inlet (Appdx H)	Confirm (X)	X	X	
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	Pass (0.370)	N/A	
	Span Pass/Fail	Pass (0.968)	N/A	
Confirm Leak Check (after maintenance)	Result	<0.5 LPM	<0.5 LPM	<0.5 LPM
	Leak repaired?	N/A	N/A	N/A

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

(1) Cleaned tape deposit from sampling surface - no flow adjustment necessary

WARM SPRINGS SITE

	DATE	6/25/2008		
	INITIALS	SH		
	EBAM OFF-LINE@	1315 MST		
	EBAM BACK ON-LINE@	1350 MST		
		Monthly Check		
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	26.2		
	Audit	25.8		
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	21%		
	Audit (Td/Tw)	25.8 / 12.2		
	Audit RH	20.2%		
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped	0.3		
	EBAM-Spinning	1.7		
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated	8.3		
	Known	8.27		
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	637.4		
	Audit	637		
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	179		
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm	190		
	+90 degrees	282		
	+180 degrees	9		
	+270 degrees	101		
	+360 degrees	189		
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	<0.5 LPM		
	Leak repaired?	N/A		
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.67		
	As left (if recalibrated)	N/A		
Flow Calibration - Low Flow (if necessary)	As found	N/A		
	As left	N/A		
Flow Calibration - High Flow (if necessary)	As found	N/A		
	As left	N/A		
Pump Test (see 2.4.1.7)	Pressure mm Hg	373 @ 14.9		
Clean Nozzle (see 2.4.5)	Confirm (X)	X		
Clean PM-10 Inlet (Appdx H)	Confirm (X)	X		
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	N/A		
	Span Pass/Fail	N/A		
Confirm Leak Check (after maintenance)	Result	<0.5 LPM		
	Leak repaired?	N/A		

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

ATTACHMENT C

AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES
SECOND QUARTER 2008

Opportunity Site April 2008 (All values are micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	13	17	10	-5	4	0	-1	10	-1	5	5	5	9	9	-3	6	-3	9	21	10	13	3	4	6	24	6.1
2	0	1	4	3	-2	-1	-5	-5	7	-1	1	4	4	5	12	-1	6	-2	23	3	0	4	2	13	24	3.1
3	1	0	4	3	3	-1	-3	-5	2	2	2	7	1	8	1	8	6	0	2	-2	7	3	2	10	24	2.5
4	4	1	-1	5	7	0	6	-5	4	1	0	-5	5	2	BA	8	17	-5	14	-5	7	21	-5	21	23	4.2
5	8	2	0	5	-3	-5	0	-4	1	-5	-5	-2	-1	6	-2	6	-2	-1	2	2	19	-2	8	5	24	1.3
6	8	1	8	1	0	0	2	-5	-4	-5	4	1	3	13	-5	-5	-4	11	-1	3	-4	6	-5	-2	24	0.9
7	4	10	-5	22	19	-5	6	15	-4	-1	7	1	12	1	7	0	3	6	7	0	2	2	2	2	24	4.7
8	-5	6	-4	-2	-2	10	3	-5	8	1	-4	-1	1	-4	3	5	-2	2	10	-1	4	4	5	6	24	1.6
9	4	11	9	2	5	3	2	-2	6	1	6	4	2	6	6	14	20	1	0	14	10	-5	-5	14	24	5.3
10	17	9	-4	11	6	3	-2	-5	8	1	6	5	3	6	3	3	2	10	2	10	-1	13	11	10	24	5.3
11	16	2	4	3	0	3	-5	0	2	-1	8	2	0	1	15	14	5	7	6	10	-2	2	8	5	24	4.4
12	8	7	10	16	14	20	7	0	4	10	8	3	-2	3	4	-1	0	8	1	1	17	8	4	10	24	6.7
13	9	7	10	10	6	5	-5	-1	1	2	2	17	11	12	14	11	3	9	1	13	7	6	3	1	24	6.4
14	2	4	1	6	0	7	-2	17	-3	10	7	25	24	17	12	16	17	8	9	9	11	11	106	20	24	13.9
15	25	4	22	17	7	24	24	7	-2	5	5	1	7	0	-5	3	2	2	4	-1	1	1	3	1	24	6.5
16	4	8	3	-5	4	15	1	-5	3	14	8	4	1	2	1	2	10	-2	3	-2	7	5	7	-2	24	3.6
17	0	0	5	-2	5	8	6	3	0	6	8	14	11	17	BA	7	6	14	9	7	11	9	17	12	23	7.5
18	14	9	-2	8	6	2	7	8	20	12	4	10	13	23	15	2	13	14	15	20	16	24	21	22	24	12.3
19	13	15	16	12	14	12	7	7	35	25	26	7	17	23	102	148	70	81	125	42	55	-4	17	76	24	39.2
20	51	50	29	28	18	64	31	59	8	12	31	26	13	22	5	16	4	9	8	11	9	32	3	14	24	23.0
21	17	11	15	15	6	1	16	9	10	3	4	BA	15	0	-1	3	6	6	5	-5	1	1	13	5	23	6.8
22	6	3	-5	-3	0	-5	-3	-3	7	10	5	1	5	0	6	4	-5	9	12	11	9	21	8	15	24	4.5
23	8	25	13	16	19	9	2	9	8	-5	3	2	13	18	5	7	10	14	-5	-5	-5	-2	20	0	24	7.5
24	-3	19	11	19	0	13	13	12	-1	7	3	9	-4	1	6	0	6	0	2	-2	-3	-1	9	5	24	5.0
25	5	-5	1	-4	0	3	-2	-5	-3	14	-5	1	5	11	0	3	-1	12	3	22	-5	-5	2	1	24	2.0
26	-5	5	-5	7	-2	0	4	7	6	2	9	3	3	2	5	8	3	7	10	10	10	13	12	18	24	5.5
27	13	9	7	-2	7	11	-5	2	2	10	22	13	15	8	3	0	16	10	8	15	12	14	13	16	24	9.1
28	10	8	15	10	10	15	3	15	17	8	16	18	25	19	14	17	13	20	20	17	14	10	19	14	24	14.5
29	1	3	12	3	10	4	13	6	9	9	17	16	18	21	20	372	113	23	-5	11	4	3	-5	4	24	28.4
30	9	5	-2	4	4	6	0	4	21	3	4	3	9	2	14	5	2	2	-1	-1	-1	3	2	-1	24	4.0
NO.	30	30	30	30	30	30	30	30	30	30	30	29	30	30	28	30	30	30	30	30	30	30	30	30		
MAX.	51	50	29	28	19	64	31	59	35	25	31	26	25	23	102	372	113	81	125	42	55	32	106	76		
AVG.	9	8	6	7	6	7	4	5	6	5	7	7	8	8	9	23	11	9	10	7	8	7	10	11		

Note: Negative values will be addressed with development of a detection limit in the annual report.

Opportunity Site May 2008 (All values are micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	0	6	-1	3	1	6	0	8	7	7	5	-3	8	-5	4	0	-1	4	4	5	0	6	2	-2	24	2.7
2	11	11	14	8	6	6	-4	-3	7	3	6	4	1	2	0	3	12	2	12	4	15	7	8	7	24	5.9
3	14	6	6	7	2	0	4	15	7	15	7	1	10	7	9	2	9	7	12	8	2	8	9	7	24	7.3
4	7	9	8	9	8	6	-1	16	5	2	-2	10	10	7	6	7	4	14	22	16	17	10	0	11	24	8.4
5	8	12	9	1	17	1	8	7	6	BA	11	10	8	7	7	12	8	12	8	7	16	10	7	8	23	8.7
6	15	8	11	6	10	10	0	3	13	12	22	0	24	7	10	6	11	11	4	-1	6	13	12	10	24	9.3
7	10	9	8	5	10	18	16	22	9	6	8	7	-5	1	3	4	2	6	-1	15	10	6	33	3	24	8.5
8	15	6	4	0	18	7	2	2	1	1	13	-5	10	2	10	8	6	6	8	-1	11	5	2	11	24	5.9
9	12	13	3	9	5	39	5	6	8	AN	AN	AN	AN	AN	AN	AN	5	-3	14	5	6	1	15	8	17	8.9
10	15	14	-5	22	-5	5	8	-4	-3	2	4	2	6	10	-2	5	3	-1	9	6	12	7	12	4	24	5.3
11	10	-3	8	10	33	6	-4	1	13	21	3	10	4	3	13	7	6	5	2	4	6	7	-2	4	24	7.0
12	8	6	3	6	6	4	5	5	-4	5	22	-1	4	-1	6	-4	6	-1	3	10	6	0	5	12	24	4.6
13	7	11	0	21	13	-4	-2	0	4	9	9	0	2	-1	3	4	6	4	9	0	8	5	1	-5	24	4.3
14	-2	1	-5	4	0	8	-5	4	-5	-5	-2	-2	-3	-3	-2	-5	2	-5	1	5	-2	-3	-2	-1	24	-1.1
15	1	2	8	-5	30	4	-5	1	3	3	3	12	0	0	6	3	-3	5	4	7	6	5	10	-5	24	4.0
16	11	10	1	0	4	2	-1	2	3	6	-1	12	7	BA	8	11	12	1	15	13	19	20	18	8	23	7.9
17	10	12	8	6	9	3	10	19	15	16	11	13	15	12	12	12	17	11	11	9	18	11	6	1	24	11.1
18	9	4	3	15	7	11	8	12	15	14	6	15	6	12	2	18	7	7	6	11	8	4	10	11	24	9.2
19	13	14	8	-1	14	13	3	11	15	15	3	10	5	4	8	2	7	9	8	3	8	25	9	15	24	9.2
20	3	8	4	3	7	2	10	11	2	23	17	14	17	27	16	97	11	26	9	9	23	6	11	5	24	15.0
21	-5	7	-1	21	3	5	8	5	-5	-1	3	5	-1	4	1	1	0	6	5	3	3	-1	6	6	24	3.3
22	4	-5	14	-2	2	-2	1	2	7	5	-5	-1	2	9	6	-1	0	-4	6	7	10	-5	-3	1	24	2.0
23	1	0	20	-5	2	11	-3	-4	13	13	7	-1	-5	1	-5	-3	2	-4	-1	-3	1	2	1	3	24	1.8
24	-2	-1	34	4	0	16	9	0	-2	-4	-3	5	6	-5	1	-4	1	8	3	-5	20	7	11	-5	24	3.9
25	23	6	14	17	16	-3	6	-5	2	-3	-1	1	2	4	4	-5	2	0	4	2	2	3	1	-1	24	3.8
26	3	35	2	6	8	2	-3	0	-5	-1	2	0	6	1	4	2	9	0	8	1	3	-4	-4	5	24	3.3
27	-1	3	-5	3	2	3	0	-4	1	4	-3	0	-5	0	3	-3	2	4	8	5	2	10	9	5	24	1.8
28	-5	4	28	8	-5	6	-4	5	5	3	9	6	10	-5	7	11	1	11	2	5	6	7	10	2	24	5.3
29	7	0	10	7	3	0	-2	-1	-1	7	-5	0	9	-2	3	-2	6	7	8	4	-5	0	5	10	24	2.8
30	-5	24	5	4	-5	2	-1	0	1	2	-1	6	23	-5	-5	8	6	-1	4	2	9	11	4	1	24	3.7
31	9	3	-2	11	5	10	-5	-4	3	-1	1	-3	2	2	3	7	7	3	-1	-5	2	-1	-3	0	24	1.8
NO.	31	31	31	31	31	31	31	31	31	29	30	30	30	29	30	30	31	31	31	31	31	31	31	31		
MAX.	23	35	34	22	33	39	16	22	15	23	22	15	24	27	16	97	17	26	22	16	23	25	33	15		
AVG.	7	8	7	7	7	6	2	4	5	6	5	4	6	3	5	7	5	5	7	5	8	6	7	4		

Note: Negative values will be addressed with development of a detection limit in the annual report.

Opportunity Site June 2008 (All values are micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	10	4	8	3	-1	-4	0	3	-2	-5	7	8	BA	-5	1	14	-3	10	7	-2	8	-3	11	7	23	3.3
2	25	20	10	7	9	25	2	-5	4	2	4	-1	9	50	-5	-5	17	-5	10	9	5	8	0	4	24	8.3
3	8	-5	-5	-4	27	14	-2	3	7	-4	8	20	2	4	5	2	7	4	4	7	10	4	6	-1	24	5.0
4	14	-5	-5	7	7	10	15	4	-5	7	1	-1	7	1	-5	-3	-1	6	5	-5	4	-5	3	-1	24	2.3
5	4	1	17	5	3	9	10	3	-5	-3	2	1	-1	4	-2	15	-4	2	6	-1	16	-5	16	2	24	4.0
6	7	6	-5	18	-3	3	20	6	-5	1	-5	5	-4	13	1	-2	-1	6	2	-2	-1	2	-5	-3	24	2.3
7	-2	0	2	0	-2	-3	-2	-5	-2	1	0	5	4	6	7	2	0	4	7	-3	-3	1	-5	11	24	1.0
8	-2	1	-2	6	-1	0	3	3	-5	-4	6	-1	-2	1	9	1	3	9	6	-3	3	0	1	8	24	1.7
9	9	4	5	9	3	-3	6	2	-2	0	1	-3	3	8	9	3	-1	1	-2	3	10	-5	19	-5	24	3.1
10	-5	12	8	-5	18	13	-5	2	20	15	-5	12	0	10	-4	1	-5	2	-4	7	5	-3	5	-1	24	3.9
11	-3	-3	-5	-2	5	-1	1	-4	-3	2	1	-4	-5	1	-4	8	-1	-2	-5	-5	-4	13	4	1	24	-0.6
12	6	1	5	-4	2	-5	-3	-1	-3	1	0	1	1	0	3	5	2	0	-3	0	0	2	9	-2	24	0.7
13	1	3	1	4	1	1	0	-2	-1	8	10	6	3	7	3	-5	-1	-4	8	9	3	4	5	3	24	2.8
14	4	13	6	1	5	-5	6	-1	6	7	6	5	2	5	4	4	5	4	9	2	14	10	10	1	24	5.1
15	9	4	8	2	9	-5	4	0	7	9	14	7	9	9	10	5	-1	5	5	10	12	7	9	5	24	6.4
16	14	15	3	13	12	-5	2	7	6	11	11	9	10	2	59	11	4	8	5	10	19	11	14	12	24	11.0
17	7	1	8	5	9	1	7	8	18	17	11	12	26	11	10	-3	13	0	10	16	11	12	6	5	24	9.2
18	10	-1	9	9	9	-5	5	9	8	7	10	12	16	9	8	14	6	12	10	11	14	13	2	15	24	8.8
19	20	9	-5	18	15	-1	2	4	12	10	8	3	BA	2	8	2	11	9	10	-1	9	8	13	12	23	7.7
20	5	6	4	5	13	-1	7	10	-5	4	10	2	7	1	-1	4	11	7	3	19	27	10	10	4	24	6.8
21	1	12	-4	4	10	7	1	8	9	4	7	11	8	21	8	1	5	10	8	11	6	15	16	4	24	7.6
22	10	8	7	0	5	5	-5	11	-5	2	3	6	0	2	3	5	10	-2	20	14	29	8	7	8	24	6.3
23	10	9	14	5	11	-3	-5	6	10	7	3	18	7	4	8	6	12	12	11	11	11	5	7	11	24	7.9
24	11	7	0	6	9	6	-4	6	1	1	6	10	7	7	-2	8	9	8	12	14	13	17	14	0	24	6.9
25	18	3	14	6	18	16	2	23	7	7	3	15	3	7	7	BA	11	11	5	9	12	17	6	4	23	9.7
26	6	-1	10	5	-1	5	12	2	9	12	2	11	17	15	16	13	7	3	8	7	6	5	5	6	24	7.5
27	8	10	3	8	6	-3	8	3	5	10	11	12	6	14	13	19	13	12	15	14	54	11	8	9	24	11.2
28	8	8	16	11	21	10	8	10	10	4	6	5	4	14	12	3	7	6	13	10	31	21	18	7	24	11.0
29	16	13	10	16	4	2	13	13	12	9	13	5	6	12	11	13	5	17	8	17	19	22	25	11	24	12.2
30	14	9	12	6	27	6	14	4	8	13	18	16	13	17	10	19	20	9	37	17	29	9	4	13	24	14.3
NO.	30	30	30	30	30	30	30	30	30	30	30	30	28	30	30	29	30	30	30	30	30	30	30	30		
MAX.	25	20	17	18	27	25	20	23	20	17	18	20	26	50	59	19	20	17	37	19	54	22	25	15		
AVG.	8	5	5	5	8	3	4	4	4	5	6	7	6	8	7	6	5	5	8	7	12	7	8	5		

Note: Negative values will be addressed with development of a detection limit in the annual report.

Warm Springs Site April 2008 (All values are micrograms per cubic meter at Local temperature and pressure

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	5	7	16	12	14	10	1	-5	2	-4	12	3	35	2	-5	-5	4	12	8	1	5	4	-2	12	24	6.0
2	10	5	8	5	15	8	10	6	-5	-4	11	8	-5	4	14	3	6	1	0	-2	6	4	16	1	24	5.2
3	0	-1	-5	2	-2	9	-5	-1	1	3	3	12	8	3	3	6	7	-4	8	-5	5	6	-1	6	24	2.4
4	-2	4	0	11	3	2	-5	-2	7	-4	-1	-4	16	13	4	1	11	2	16	9	-2	2	-5	4	24	3.3
5	16	9	-2	-5	1	-1	-5	-2	-5	-5	-5	-2	1	3	2	-3	-4	2	-5	3	-1	2	-5	5	24	-0.3
6	7	-5	0	-1	-5	-5	-5	-5	4	-5	4	6	-1	7	-5	19	-3	3	10	12	3	5	6	10	24	2.3
7	16	1	7	10	-5	-5	7	-5	-5	0	1	4	BA	15	-2	-5	8	0	-2	1	5	-4	4	-3	23	1.9
8	0	-1	-1	-1	-1	-5	-5	-5	3	-5	0	4	-4	-5	2	0	0	7	3	-2	8	6	13	8	24	0.8
9	2	-5	3	-1	6	10	-2	-5	3	0	10	1	0	9	10	-5	10	1	10	11	7	-1	0	13	24	3.6
10	21	4	5	15	11	-3	-3	5	-1	5	-5	-2	2	-1	2	13	2	12	28	6	12	-4	15	-5	24	5.6
11	18	10	13	6	15	15	-1	1	3	-4	6	13	-1	4	2	10	3	2	2	3	10	12	5	10	24	6.5
12	16	3	5	6	13	15	20	-5	-5	10	17	-1	6	11	5	6	5	2	1	-4	7	6	5	9	24	6.4
13	6	2	10	6	10	3	-5	9	5	12	5	6	7	11	12	6	4	7	0	-1	-3	-2	4	2	24	4.8
14	5	-1	5	-2	2	1	3	8	4	17	6	11	23	11	BA	19	17	2	4	20	6	21	30	13	23	9.8
15	2	17	11	24	12	2	13	4	3	6	4	1	4	0	15	-5	5	-5	9	-5	-1	-2	3	-1	24	4.8
16	-3	2	2	7	5	10	-5	-5	13	12	-5	-3	5	-3	5	-1	8	-5	5	-5	2	5	6	1	24	2.2
17	1	-4	-5	0	7	4	4	11	8	15	9	12	BA	BA	15	16	18	14	-1	-2	11	13	7	11	22	7.5
18	13	1	9	6	9	9	-5	6	9	13	12	47	12	11	-5	2	18	4	5	17	12	18	19	17	24	10.8
19	9	21	11	6	9	8	-1	11	29	41	13	11	24	16	129	100	207	194	256	164	86	23	27	56	24	60.4
20	-5	29	50	-5	10	-5	13	-5	14	5	8	35	17	16	4	5	3	8	7	2	12	7	7	23	24	10.6
21	6	18	17	22	9	8	5	24	-1	2	-5	7	-4	1	-5	6	-5	-3	15	-5	4	6	-4	9	24	5.3
22	4	11	-5	2	-2	-5	-4	10	9	9	9	13	11	15	0	5	-3	4	5	4	11	12	24	21	24	6.7
23	11	8	-5	20	7	5	10	7	9	-1	3	8	12	1	9	-5	1	6	4	2	7	-5	6	0	24	5.0
24	8	12	5	12	12	-5	14	-5	15	-5	5	6	-3	-5	-2	2	-5	7	-5	-1	-5	-4	2	12	24	2.8
25	3	2	-1	-4	4	3	-5	-4	-5	43	-5	7	-2	25	-4	9	-5	-5	8	18	2	2	-4	8	24	3.8
26	4	-5	-2	9	-3	3	-5	8	-5	5	7	13	5	10	11	0	6	1	-3	-5	7	9	7	18	24	4.0
27	12	2	16	8	8	0	-5	6	8	8	6	16	17	14	8	7	-2	14	11	12	-1	12	14	17	24	8.7
28	15	11	16	13	5	3	12	11	14	21	18	22	21	11	18	11	7	7	8	-4	-5	8	15	2	24	10.8
29	12	7	4	9	8	14	12	12	19	23	17	14	9	20	17	22	16	7	-1	5	0	10	12	7	24	11.5
30	5	-3	1	9	0	3	-3	7	15	-4	-2	14	-5	-5	9	-5	3	-3	0	-4	1	8	13	1	24	2.3
NO.	30	30	30	30	30	30	30	30	30	30	30	30	28	29	29	30	30	30	30	30	30	30	30	30		
MAX.	21	29	50	24	15	15	20	24	29	43	18	47	35	25	129	100	207	194	256	164	86	23	30	56		
AVG.	7	5	6	7	6	4	2	3	6	7	5	9	8	7	9	8	11	10	14	8	7	6	8	10		

Note: Negative values will be addressed with development of a detection limit in the annual report.

Warm Springs Site May 2008 (All values are micrograms per cubic meter at Local temperature and pressure

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	5	5	6	11	2	-5	18	17	1	8	4	11	16	26	14	0	13	-5	-4	-5	4	12	6	5	24	6.9
2	3	6	2	9	-5	1	0	6	13	0	1	5	6	4	-2	9	6	8	-2	-5	10	3	5	7	24	3.8
3	3	6	6	-5	3	6	0	3	15	4	10	6	11	6	8	7	0	4	12	1	3	6	24	8	24	6.1
4	11	13	12	11	7	10	-2	13	16	15	16	13	15	8	-1	7	21	-5	6	0	-5	13	15	12	24	9.2
5	16	14	10	14	12	8	-5	12	6	BA	16	12	13	4	4	12	7	2	9	7	-5	6	7	-1	23	7.8
6	5	5	13	0	10	6	1	12	19	11	10	18	13	-2	20	13	2	3	5	2	6	15	12	6	24	8.5
7	1	10	10	9	9	15	20	4	8	11	8	13	8	2	13	-5	11	3	13	9	11	-5	10	-3	24	7.7
8	21	8	1	18	11	8	-1	2	2	8	10	5	10	10	3	2	-5	-4	7	8	13	9	4	6	24	6.5
9	11	9	17	13	14	5	2	11	17	17	21	16	13	15	12	-5	18	-2	6	0	10	-5	5	4	24	9.3
10	7	-2	-5	0	-5	1	15	2	3	-2	0	9	6	0	12	-5	10	11	4	2	0	7	8	-2	24	3.2
11	0	2	10	2	7	0	9	15	9	9	8	5	-5	3	9	3	1	2	14	3	-5	1	1	5	24	4.5
12	9	11	12	4	17	7	-1	1	6	14	-5	11	-5	12	9	-5	-1	3	-5	13	1	-1	2	10	24	5.0
13	5	0	4	13	-3	-1	9	-2	1	8	-5	0	0	-2	11	0	2	5	-5	0	1	4	5	11	24	2.5
14	1	5	3	7	4	2	1	2	5	4	2	8	4	-4	-1	-5	21	-5	1	-1	-1	2	-4	-1	24	2.1
15	5	0	0	-5	4	13	-5	3	1	7	5	9	3	8	5	1	0	4	3	5	3	3	3	3	24	3.3
16	1	8	5	13	-2	15	-2	7	4	16	12	BA	16	0	9	10	-1	11	12	9	7	-1	4	11	23	7.1
17	11	8	7	7	18	15	7	17	19	16	18	11	14	13	18	19	7	5	15	23	6	4	12	12	24	12.6
18	27	1	10	7	9	-3	11	AN	10	11	11	3	6	6	12	0	6	11	9	6	6	9	2	16	23	8.1
19	12	4	11	9	13	11	9	20	30	8	9	15	10	4	6	20	6	9	14	1	3	-5	6	5	24	9.6
20	11	6	2	6	9	2	11	18	16	11	8	11	3	14	7	108	0	24	4	21	15	7	-4	-1	24	12.9
21	0	1	3	-1	6	-1	3	5	5	-5	7	-1	10	-5	2	12	-5	1	2	-4	2	2	4	4	24	2.0
22	20	-5	0	-1	-1	2	-3	13	3	8	12	-5	-5	7	-5	7	1	7	-1	-1	10	-5	-2	3	24	2.5
23	0	0	11	5	-5	1	-5	19	0	7	0	-5	-5	8	-3	1	5	11	5	0	2	5	4	4	24	2.7
24	0	5	3	-5	11	18	3	-4	2	-4	7	-4	-5	-5	0	-5	9	-5	9	-5	4	2	17	-4	24	1.8
25	12	8	14	-4	10	-1	7	10	6	-4	1	-1	-5	11	7	-5	4	-5	4	-5	-1	-1	5	6	24	3.0
26	4	3	-3	2	1	1	0	-5	-5	-1	-1	2	5	3	0	20	-4	-2	4	2	1	-3	3	1	24	1.2
27	2	3	1	0	4	5	-5	-2	0	1	5	7	3	-5	-2	-5	-5	4	-4	-4	-1	7	10	-2	24	0.7
28	6	30	-5	15	2	-5	23	0	17	2	2	9	9	-5	12	11	-5	-5	10	5	-4	5	-3	4	24	5.4
29	-5	5	2	2	10	12	-5	13	-4	2	-4	1	6	-5	1	8	-5	4	-2	-5	1	18	1	-5	24	1.9
30	6	-2	23	1	15	21	6	-5	0	-1	2	1	13	-5	1	8	-3	-5	4	-2	-1	17	4	7	24	4.4
31	2	-5	1	9	8	-2	20	5	5	-3	5	6	0	15	-5	8	4	-5	-3	2	0	-2	-4	3	24	2.7
NO.	31	31	31	31	31	31	31	30	31	30	31	30	31	31	31	31	31	31	31	31	31	31	31	31		
MAX.	27	30	23	18	18	21	23	20	30	17	21	18	16	26	20	108	21	24	15	23	15	18	24	16		
AVG.	7	5	6	5	6	5	5	7	7	6	6	6	6	5	6	8	4	3	5	3	3	4	5	4		

Note: Negative values will be addressed with development of a detection limit in the annual report.

Warm Springs Site June 2008 (All values are micrograms per cubic meter at Local temperature and pressure

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	6	2	4	3	2	7	4	8	7	8	0	BA	7	-5	7	5	-5	19	8	-5	-4	-4	1	6	23	3.5
2	14	13	3	1	-2	24	3	-3	11	4	14	-3	18	25	-5	-5	36	-5	4	12	-5	3	0	7	24	6.8
3	-5	24	-3	-5	12	-1	-1	8	4	1	16	4	3	3	0	16	4	-2	2	2	3	10	-1	9	24	4.3
4	4	10	-5	6	-5	1	0	-5	11	-5	17	4	4	-5	5	-5	-4	-3	-2	-2	1	8	2	13	24	1.9
5	-1	11	10	4	14	-5	-5	12	1	8	6	-1	5	-1	1	15	-5	2	3	-5	7	5	1	13	24	4.0
6	-1	1	13	-3	-5	-5	4	-5	9	-1	-3	11	4	6	-2	2	8	-1	0	3	-1	-3	-1	-5	24	1.0
7	-5	0	-2	5	-5	-4	-5	1	-5	-5	-5	3	4	-5	-4	-2	-2	4	-5	1	-1	3	-5	-4	24	-1.8
8	19	6	3	10	-5	8	12	11	-5	0	7	-4	-5	-2	8	5	4	-5	-1	-5	2	5	0	8	24	3.2
9	6	5	7	11	4	12	4	2	5	-2	1	-5	17	-3	8	-5	5	1	4	1	-4	13	1	-5	24	3.5
10	28	-5	10	-5	16	-5	30	3	3	-5	-5	12	-5	3	-3	-4	9	-5	-5	3	0	0	-2	6	24	3.1
11	2	-2	-3	6	4	10	-5	-5	16	-2	-1	8	2	1	-1	-5	3	-1	-5	-5	-3	5	4	13	24	1.5
12	-5	5	2	7	2	-5	-5	-5	-5	-5	-5	0	-2	1	5	-1	-5	5	-5	-5	-1	1	-4	1	24	-1.2
13	3	-2	5	-4	2	5	-5	4	-1	9	-5	-1	-5	4	-4	BA	-2	5	4	5	-5	8	-1	7	23	1.1
14	0	8	6	2	12	1	-5	15	6	1	5	6	5	3	3	11	3	1	-2	10	-5	5	4	2	24	4.0
15	6	7	0	11	12	-5	5	11	14	3	1	10	2	9	11	-1	9	6	10	2	-3	-5	9	5	24	5.4
16	11	11	7	10	5	6	2	11	16	13	7	18	7	15	10	4	-1	10	11	9	-1	1	3	6	24	8.0
17	9	5	9	0	12	12	14	7	17	7	18	12	19	10	9	17	11	2	12	7	6	8	5	6	24	9.8
18	2	10	4	10	9	0	10	11	12	12	21	18	11	15	13	22	-5	16	8	15	3	8	6	17	24	10.3
19	17	10	15	-3	21	8	13	18	14	2	BA	9	4	9	2	5	22	3	4	2	17	-5	12	14	23	9.3
20	7	15	6	10	14	-1	3	13	9	12	8	2	0	-1	0	53	11	3	17	6	13	-1	6	2	24	8.6
21	2	4	1	5	6	6	7	12	15	10	8	4	7	6	7	5	-3	6	36	5	-4	22	14	-1	24	7.5
22	9	11	14	7	5	4	-5	17	4	8	14	20	-4	14	5	1	14	35	1128	7	10	10	-3	9	24	55.6
23	4	10	3	0	13	6	-4	14	4	6	21	8	11	7	3	5	11	0	10	11	5	13	-3	3	24	6.7
24	6	11	1	9	3	14	-5	16	10	11	21	14	4	14	6	7	6	-5	14	7	-2	9	9	5	24	7.7
25	12	8	8	1	10	10	4	12	15	5	12	8	8	BA	18	1	14	2	12	11	5	11	9	3	23	8.7
26	14	8	6	-2	7	7	14	16	16	9	28	13	10	7	6	8	8	12	23	4	0	-3	8	1	24	9.2
27	0	1	13	3	2	9	6	10	12	7	6	9	16	16	14	9	7	4	12	3	10	13	6	16	24	8.5
28	1	11	14	2	13	7	9	11	16	6	7	16	1	7	7	5	5	10	11	17	12	12	9	5	24	8.9
29	12	7	5	5	7	8	14	11	15	8	13	12	7	0	9	10	8	15	9	30	9	12	25	21	24	11.3
30	9	10	8	10	2	8	2	13	16	10	10	8	14	19	1	3	15	8	25	14	10	8	5	12	24	10.0
NO.	30	30	30	30	30	30	30	30	30	30	29	29	30	29	30	29	30	30	30	30	30	30	30	30		
MAX.	28	24	15	11	21	24	30	18	17	13	28	20	19	25	18	53	36	35	1128	30	17	22	25	21		
AVG.	6	7	5	4	6	5	4	8	9	5	8	7	6	6	5	6	6	5	45	5	2	6	4	7		

Note: Negative values will be addressed with development of a detection limit in the annual report.

Qualifier Codes and Descriptions

as of 12-APR-07

Qualifier Type	Qualifier Type Desc	Qualifier Code	Qualifier Desc
EX	Exceptional Event Qualifier	D	SANDBLASTING
		F	STRUCTURAL FIRE
		H	CHEMICAL SPILLS & INDUST. ACCIDENTS
		I	UNUSUAL TRAFFIC CONGESTION
		J	CONSTRUCTION/DEMOLITION
		K	AGRICULTURAL TILLING
		L	HIGHWAY CONSTRUCTION
		M	REROUTING OF TRAFFIC
		N	SANDING/SALTING OF STREETS
		O	INFREQUENT LARGE GATHERINGS
		P	ROOFING OPERATIONS
		Q	PRESCRIBED BURNING
		R	CLEAN UP AFTER A MAJOR DISASTER
NAT	Natural Event Qualifier	A	HIGH WINDS
		B	STRATOSPHERIC OZONE INTRUSION
		C	VOLCANIC ERUPTIONS
		E	FOREST FIRE
		G	HIGH POLLEN COUNT
		S	SEISMIC ACTIVITY
		U	SAHARA DUST
NULL	Null Data Qualifier	AA	SAMPLE PRESSURE OUT OF LIMITS
		AB	TECHNICIAN UNAVAILABLE
		AC	CONSTRUCTION/REPAIRS IN AREA
		AD	SHELTER STORM DAMAGE
		AE	SHELTER TEMPERATURE OUTSIDE LIMITS
		AF	SCHEDULED BUT NOT COLLECTED
		AG	SAMPLE TIME OUT OF LIMITS
		AH	SAMPLE FLOW RATE OUT OF LIMITS
		AI	INSUFFICIENT DATA (CANNOT CALCULATE)
		AJ	FILTER DAMAGE
		AK	FILTER LEAK
		AL	VOIDED BY OPERATOR
		AM	MISCELLANEOUS VOID
		AN	MACHINE MALFUNCTION
		AO	BAD WEATHER
		AP	VANDALISM
		AQ	COLLECTION ERROR
		AR	LAB ERROR
		AS	POOR QUALITY ASSURANCE RESULTS
		AT	CALIBRATION
		AU	MONITORING WAIVED
		AV	POWER FAILURE (POWR)
		AW	WILDLIFE DAMAGE
		AX	PRECISION CHECK (PREC)
		AY	Q C CONTROL POINTS (ZERO/SPAN)
		AZ	Q C AUDIT (AUDT)

		BA	MAINTENANCE/ROUTINE REPAIRS
		BB	UNABLE TO REACH SITE
		BC	MULTI-POINT CALIBRATION
		BD	AUTO CALIBRATION
		BE	BUILDING/SITE REPAIR
		BF	PRECISION/ZERO/SPAN
		BG	Missing ozone data not likely to exceed level of standard
		BH	Interference/co-elution
		BI	Lost or damaged in transit
		BJ	Operator Error
		BK	Site computer/data logger down
		SA	Storm Approaching
QA	Quality Assurance Qualifier	1	Deviation from a CFR/Critical Criteria Requirement
		2	Operational Deviation
		3	Field Issue
		4	Lab Issue
		5	Outlier
		6	QAPP Issue
		7	Below Lowest Calibration Level
		9	Negative value detected - zero reported
		MD	Value between MDL and IDL
		ND	No Value Detected
		SQ	Values Between SQL and MDL
		V	VALIDATED VALUE
		W	FLOW RATE AVERAGE OUT OF SPEC.
		X	FILTER TEMPERATURE DIFFERENCE OUT OF SPEC.
		Y	ELAPSED SAMPLE TIME OUT OF SPEC.